Claims

1. An AAV vector comprising a capsid protein with an amino acid insertion following the capsid amino acid at a position selected from the group consisting of :

(a) a position corresponding to position 139 in the VP1 capsid (SEQ ID NO: 13) and

(b) a position corresponding to position 161 in the VP1 capsid (SEQ ID NO: 13).

2. The AAV vector of claim 1 wherein said position corresponds to position 139.

3. The AAV vector of claim 1 wherein said position corresponds to position 161.

4. An AAV vector comprising a capsid protein with an amino acid insertion following the capsid amino acid at a position selected from the group consisting of:

(a) a position corresponding to position 459 in the VP1 capsid (SEQ ID NO: 13);

(b) a position corresponding to position 584 in the VP1 capsid (SEQ ID NO: 13);

(c) a position corresponding to position 588 in the VP1 capsid (SEQ ID NO: 13); and

(d) a position corresponding to position 657 in the VP1 capsid (SEQ ID NO: 13).

5. The AAV vector of claim 4 wherein said position corresponds to position 459.

6. The AAV vector of claim 4 wherein said position corresponds to position 584.

7. The AAV vector of claim 4 wherein said position corresponds to position 588.

8. The AAV vector of claim 4 wherein said position corresponds to position 657.

9. The AAV vector of claim 1, 2, 3, 4, 5, 6, 7 or 8 wherein the amino acid insertion comprises a targeting peptide.

10. The AAV vector of claim 9 wherein the targeting peptide comprises the amino acids CDCRGDCFC (SEQ ID NO: 10).

11. The AAV vector of claim 9 wherein the targeting peptide comprises the amino acids TPFYLK (SEQ ID NO: 16).

12. The AAV vector of claim 9 wherein the targeting peptide comprises the amino acids HCSTCYYHKS (SEQ ID NO: 17).

13. The AAV vector of claim 1, 2, 3, 4, 5, 6, 7 or 8 wherein the amino acid insertion comprises an immunogen.

14. The AAV vector of claim 1, 2, 3, 4, 5, 6, 7 or 8 wherein the amino acid insertion comprises a substrate for an enzymatic reaction.

15. The AAV vector of claim 14 where the substrate is a biotin acceptor peptide.

16. The AAV vector of claim 15 wherein the biotin acceptor peptide comprises the amino acids GLNDIFEAQKIEWHE (SEQ ID NO: 11).

17. The AAV vector of claims 1, 2, 3, 4, 5, 6, 7, 8, 10, 11 or 12 wherein the insertion is flanked by a linker/scaffolding sequence.

18. The AAV vector of claim 9 wherein the amino acid insertion is flanked by a linker/scaffolding sequence.

19. The AAV vector of claim 13 wherein the amino acid insertion is flanked by a linker/scaffolding sequence.

20. The AAV vector of claim 14 wherein the amino acid insertion is flanked by a linker/scaffolding sequence.

21. An AAV vector of claim 17, 18, 19 or 20 wherein the linker/scaffolding sequence comprises the amino acids TG amino terminal to the insertion and ALS carboxy terminal to the insertion.

22. An AAV vector of claim 17, 18, 19 or 20 wherein the linker/scaffolding sequence comprises the amino acids TG amino terminal to the insertion and LLA carboxy terminal to the insertion.

23 . An AAV vector of claim 17, 18, 19 or 20 wherein the linker/scaffolding sequence comprises the amino acids TG amino terminal to the insertion and GLS carboxy terminal to the insertion.

24. The AAV vector of any one of claims 1 through 23 wherein the AAV vector is an AAV2 vector.

25. A polynucleotide encoding the capsid protein of any one of claims 1 through 24.

26. A cell transfected with the polynucleotide of claim 25.

27. A method of producing AAV vector comprising a capsid protein with an amino acid insertion, comprising growing a packaging cell and providing the packaging cell with helper virus functions, wherein said packaging cell comprises the polynucleotide of claim 25, the AAV rep gene and a recombinant AAV genome comprising DNA of interest flanked by AAV inverted terminal repeats.

28. The method of claim 27 wherein said cell expresses biotin ligase.

29. The method of claim 27 further comprising the step of treating said AAV vector produced with biotin ligase.

30. A method of transferring a DNA of interest to a cell comprising delivering to the cell an AAV vector of any one of claims 1 through 24.

31. The method of claim 30 wherein the cell is a cancer cell.

32. The method of claim 31 wherein the cell is an ovarian cancer cell.

33. The method of claim 30 wherein the DNA of interest encodes a therapeutic peptide or a reporter peptide.

34. The method of claim 30 wherein the DNA of interest is an antisense nucleic acid or ribozyme.

35. A pharmaceutical composition comprising the AAV vector of any one of claims 1 through 24 in a pharmaceutically acceptable carrier.

36. An immunogenic composition comprising the AAV vector of any one of claims 13, 19, 21 through 23 or 24.

37. A method for eliciting an immune response in an animal, said method comprising administering to the animal an immunogenic composition of claim 36.

38. A method of transferring a DNA of interest to a cell comprising delivering an AAV vector encoding the DNA of interest to the cell, wherein said AAV vector comprises a capsid protein containing one or more amino acid insertions that ablate the ability of the vector to bind heparin-sulfate proteoglycan and allow the vector to use a cellular receptor not used by wild type AAV for DNA transfer.

39. A method of infecting a cell comprising administering an AAV vector to the cell, wherein said AAV vector comprises a capsid protein containing an amino acid insertion, wherein said AAV vector comprises a capsid protein containing one or more amino acid insertions that ablate the ability of the vector to bind heparin-sulfate proteoglycan and allow the vector to use a cellular receptor not used by wild type AAV for infection.

40. The method of claim 39 wherein the AAV vector infects the cell at a titer comparable to wild type AAV vector.

41. An AAV vector comprising biotinylated capsid protein.